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GUY P. JONES
Editor

A Summary of the Present Status of Coccidioidal Infection

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Coccidioidal infection is very common in certain regions of our State, may be acquired by transient exposure and may produce a variety of clinical manifestations, most of which are entirely benign. Prior to the discoveries of Gifford and Dickson five years ago, the only recognized form of infection was coccidioidal granuloma. Our fixed ideas of coccidioidal granuloma frequently mislead us in our attitude toward the mild infections. Moreover, the frequently mentioned analogy between tuberculosis and coccidioidal infections may result in the fear that reexposure will produce reinfection and even in isolation of coccidioidal patients. Thus familiarity with coccidioidal infection is a responsibility of California's medical group and especially those in public health.

However, the fungus is by no means confined to the San Joaquin Valley or even the State to which it has given a notorious reputation. Other North American endemic areas include certain arid regions of Arizona, Texas and probably New Mexico and Mexico. The focus in South America is the Chaco region of Argentina, Uruguay and Bolivia from which came Posada's first case. Sporadic cases have been reported elsewhere, but diagnostic confirmation is lacking in many. In practically all the rest, history of past residence or contact with dusty products from the expanded endemic area is not eliminated.

While a comparison with tuberculosis can be overdrawn, it is useful in fixing some facts. The usual form of tuberculous infection is the primary or childhood type. At least in the past, most urban adults have inhaled tubercle bacilli which produced pul-

monary lesions. Any accompanying symptoms were so ill-defined as to be rarely recognizable. The host nearly always walled off or "arrested" the process successfully, but thereafter was reactive to tuberculin. Similarly, over three-quarters of those who reside in some parts of the San Joaquin Valley endemic area over 10 years and, as Joseph Aronson and his colleagues of the U. S. Indian Service have shown, forty-nine fiftieths of some Arizona Indian groups, have gone through unrecognized coccidioidal infection. The sequence of events appears to be similar. While many of the primary coccidioidal infections are asymptomatic, it is our impression that more severe constitutional symptoms are common than with primary tuberculosis. However, malaise, chills, fever, cough (slightly productive), night sweats, loss of appetite, headache and backache are symptoms shared by influenza and many other acute infections. It is no wonder that the illness is generally thought to be "flu" or "bronchitis." Primary coccidioidal infection has also been diagnosed pneumonia, paliomyelitis and typhoid fever. One frequent symptom, diagnostically helpful, is pleurisy. Pleurisy may be so severe as to be confused with a broken rib, gallstones, kidney stones or even appendicitis, but at least differentiates the illness from influenza. When actual pain is absent, patients often speak of persistent "tightness" of the chest. As in primary tuberculosis, physical signs are rarely present on chest examination. Symptoms usually persist for two to three weeks unless prolonged by erythema nodosum. They may continue even longer. Extreme fatigability often lasts

for months. Rarely, pleurisy with effusion, distinguishable from the tuberculous variety only by recovery of the causative organism, complicates the primary infection.

Occasionally, both primary tuberculosis and primary coccidioidomycosis are accompanied by erythema nodosum. Evidently the mechanism is allergic. When sensitivity is first established to tuberculin or coccidioidin, the individual may be hypersensitive and may develop erythema nodosum. Erythema nodosum occurring in primary coccidioidal infection may be called "San Joaquin Fever," "Valley Fever," "Desert Fever" or "Desert Rheumatism." Recognition of the etiology of "San Joaquin Fever" by Doctors Gifford and Dickson revolutionized our ideas of coccidioidal infection. There is generally an interval of one of two week between the onset of the systemic symptoms listed above and the erythema nodosum. The red nodules have the typical symmetrical distribution on the shins, less frequently on the lateral surfaces of the thighs, and rarely on the upper extremities. Less frequently vesicular lesions known as erythema multiforme may appear with or without nodosum. Erythema multiforme, with its distribution on the margins of the palms, the forearms and arms, around the neck and on the back and even on the face, may occasionally simulate smallpox. The chance for error is increased when, as is frequently the case, the pre-eruptive phase of systemic symptoms is severe, the patient has no erythema nodosum, and has not been vaccinated. The pre-eruptive cough and pleurisy and the arthritis and phlyctenular conjunctivitis which so frequently appear at the time of the skin eruption assist in the diagnosis. The arthritis, although never suppurative, is frequently very severe and gives rise to the name "Desert Rheumatism." This eruptive phase usually lasts one week to a month. The lesions never break down. As they disappear they look like bruises and the pigmentation may remain for months. Erythema nodosum or multiforme probably occur in 2 to 5 per cent of all primary coccidioidal infections. They are most common in white females, who also comprise the group least likely to develop coccidioidal granuloma.

The third and, mercifully, least frequent manifestation of tuberculous and coccidioidal infection is the reinfection type of disease. This is the form of the infection which is reportable in California. In the light of our more recently acquired knowledge, coccidioidal granuloma would appear to be the result of the inability of the host to focalize or wall off his primary infection. While the subsequent dissemination often occurs within a short time after the infection is acquired, the interval may be years. All

evidence indicates that the reinfection responsible for coccidioidal granuloma comes from fungus within the person himself and is not the result of reexposures to fungus in the environment. Depending upon one's ideas regarding the mechanism of reinfection in reinfection or "adult" type of tuberculosis, these views may or may not be a divergence in the parallelism of tuberculosis and coccidioidomycosis.

In the clinical and epidemiological aspects of coccidioidal granuloma we have come to familiar territory. M. Dorothy Beck, with assistance from Dickson and Rixford, prepared the California State Department of Public Health Bulletin 57, "Coccidioidal Granuloma," (out of print) and nothing more can be added to that review. The clinical side may be summarized by the statement that pathologically and symptomatically coccidioidal granuloma and reinfection tuberculosis are essentially indistinguishable. The lesions may be located in the bones, joints, lymph nodes, meninges, skin, lungs, larynx, peritoneum, testes, kidneys, adrenals, tubes, in short any tissues which the tubercle bacillus attacks except the intestinal mucosa. Multiple "cold" abscesses, especially of the subcutaneous tissue, joints and cancellous bones are more frequently coccidioidal than tuberculous but individual lesions are readily confused.

Still another manifestation of coccidioidal infection and one probably most closely mimicing tuberculosis is the solitary pulmonary cavity. The X-ray appearance is that of a thin walled tuberculous cavity, but instead of being toxic and ill the patient usually has few symptoms other than occasional bouts of blood spitting. The lesion rarely if ever progresses. Although *Coccidioides* can be recovered from the sputum, the fungus does not seed the lung as would tubercle bacilli. The clinical picture and outcome are also very different from disseminated coccidioidal granuloma. One is inclined to feel that the solitary cavity is usually a complication of the primary infection. At any rate the cavity behaves as would an arrested, circumscribed primary focus with the handicap of a persistent mechanical defect. A complete presentation of this subject is being prepared by Dr. William A. Winn, Medical Director of the Tulare-Kings Counties Joint Tuberculosis Sanitarium at Springville.

Nearly all investigators agree that coccidioidal infection is generally acquired by inhalation of the spores of the fungus occurring in nature. It will be recalled that the fungus occurs in two forms. One is the cottony white mycelium of the test tube and, presumably, nature, which forms the tiny light spores readily wafted by breezes. The other is the characteristic double contoured spherule containing endo-

spores which is seen in animal tissues and sputum or pus. The spherule form is not well adapted to the dissemination of the fungus outside the animal. The fungus does not develop an infection chain. It is pointless to isolate a patient with coccidioidal infection. This great distinction to tuberculosis cannot be over emphasized. On the other hand, the spores of the mycelial form are very infective. Laboratory infections are the rule and not the exception. Persons have been infected merely when traveling through endemic areas or handling dusty products from such regions. At least one individual was infected by contact with contaminated clothing.

(Continued in next issue)

RABIES CONTROL IN LOS ANGELES CITY

Dr. Mona E. Bettin, Pathologist of the Los Angeles City Health Department, has provided the following report on the control of rabies in Los Angeles. In the 20 years, from 1920 to 1941, she gave the Pasteur treatment to 2,564 individuals. Thousands of citizens who had been bitten by dogs and other animals were interviewed during this period. Eighty-eight thousand one hundred forty-six animal bites were reported and 4,934 animals died of rabies. In these 20 years, 16 human deaths from rabies occurred in the City of Los Angeles, nine of which victims received no treatment whatsoever. Three received early Pasteur treatment, but their wounds were treated with silver nitrate cautery or no cautery whatsoever. One had a massive infection of the hand from holding a rabid dog until it could be killed, but he died in five weeks, in spite of cautery and 28 Pasteur treatments administered in 14 days.

Since 1923, the Los Angeles City Health Department has insisted that every dog bite wound be treated with fuming nitric acid, followed by neutralization with paste of baking soda or a solution of weak ammonia water. Since the rabies virus remains at the site of inoculation for a period of four or five days, it is important that cauterization be applied as long as there is any wound to cauterize. In cases of bites on the extremities it is the practice of the Los Angeles City Health Department not to give the Pasteur treatment until the dog is examined. Such treatment may be held up for as long as one week, but it is not advisable to wait longer. Although treatment is always given without delay to persons bitten by rabid animals, it has been the practice not to give the treatment nor to advise it unless there is a definite possibility of infection with rabies virus.

The Los Angeles City Health Department believes that the Pasteur treatment is often given unnecessarily. It is also kept in mind that rabies is an *animal* infection rather than a *human* infection. There has never been a case of human rabies in the City of Los Angeles which was contracted from saliva infection. In giving the Pasteur treatment, if a patient complains of headache about the tenth or eleventh day of treatment, the procedure is discontinued at once. If he complains of untoward symptoms during the course of treatment, it is stopped at once, although such complaints have been very few in proportion to the number administered. Since the incidence of human rabies is low, it is believed that it is safer to stop the treatment rather than to have encephalitis or myelitis develop. Age has been no deterrent, however, as the treatment has been administered to infants two months of age and to adults as old as 86 years with no bad effects. Patients who have been severely bitten by rabid animals have been called in for another course of treatment six weeks after injury. It is believed that this increases immunity and gives additional protection against a possible massive infection with rabies virus.

GERMAN OR GERMANE?

An interesting question has arisen as to the origin and significance of the term "German" as applied to German measles. The Baltimore City Health Department was recently asked about this matter. The most natural assumption would probably be that the reference is to the country known in English as "Germany." However, the Oxford dictionary gives as the first definition of the word "german" or "germane" the following: "Closely akin . . . closely related . . . closely connected . . ." German measles, in the Oxford, is also specifically defined as a "contagious disease, resembling measles in a mild form"; and under the heading "measles" the term German measles is referred to as "formerly also false, French, hybrid measles: a contagious disease (*Roseola epidemica* or *Rubella*) distinct from measles, but like it in some of its symptoms." It is understood that this interesting problem of the derivation of the term "German measles" is now being subjected to critical historical investigation.—(Baltimore Health News.)

Said the old Negro, according to Kettering: "It ain't the things you know that gets you into trouble—it's the things you think you know that ain't so."

MORBIDITY**Complete Reports for Following Diseases for Week Ending August 2, 1941****Chickenpox**

143 cases: Alameda County 4, Alameda 2, Berkeley 5, Oakland 9, Contra Costa County 1, Fresno 2, Sanger 1, Los Angeles County 6, Huntington Park 1, Long Beach 1, Los Angeles 34, Pasadena 6, South Pasadena 1, Bell 1, Orange County 1, Fullerton 1, Newport Beach 1, Santa Ana 1, Sacramento 4, San Bernardino County 1, San Diego County 12, Escondido 3, San Diego 9, San Francisco 13, San Joaquin County 3, Burlingame 4, San Mateo 5, Santa Barbara 1, San Jose 2, Santa Cruz 1, Santa Rosa 5, Davis 1, Marysville 1.

Diphtheria

15 cases: Los Angeles 4, Elsinore 1, Riverside 2, Sacramento 2, Colton 1, San Diego 1, San Joaquin County 1, Shasta County 2, Yolo County 1.

German Measles

99 cases: Alameda 7, Berkeley 1, Butte County 1, Fresno County 5, Los Angeles County 10, Glendale 1, Long Beach 3, Los Angeles 6, Pasadena 1, Yosemite National Park 1, Monterey County 1, Orange County 1, Anaheim 1, Fullerton 2, Huntington Beach 1, Santa Ana 1, Banning 3, Sacramento County 1, Sacramento 1, Chula Vista 1, National City 1, San Diego 20, San Francisco 11, Stockton 1, Burlingame 1, Menlo Park 1, Santa Barbara County 1, Palo Alto 1, Sonoma County 1, Santa Rosa 1.

Influenza

38 cases: Los Angeles County 2, Glendora 1, Inglewood 1, Los Angeles 9, Pasadena 1, Sonoma County 1.

Malaria

9 cases: Los Angeles County 2, Los Angeles 1, Banning 1, San Diego 1, Stanislaus County 1, California 3.*

Measles

113 cases: Berkeley 1, Hayward 1, Oakland 2, Fresno County 3, Fresno 1, Eureka 2, Kings County 2, Los Angeles County 11, Avalon 1, Culver City 1, Hermosa 1, Huntington Park 2, Los Angeles 15, Manhattan 1, Monrovia 1, Montebello 1, San Marino 2, Santa Monica 1, South Pasadena 1, South Gate 5, Monterey County 3, Monterey 5, Napa 13, Fullerton 3, Huntington Beach 1, Riverside County 1, Beaumont 1, Sacramento 2, San Diego 11, San Francisco 6, Stockton 2, Tracy 1, Arroyo Grande 1, Sonoma County 5, Woodland 2.

Mumps

332 cases: Alameda County 4, Alameda 17, Berkeley 3, Hayward 2, Oakland 3, San Leandro 1, Fresno County 1, Kern County 8, Bakersfield 3, Taft 1, Tehachapi 2, Kings County 1, Los Angeles County 17, Alhambra 2, Burbank 1, Compton 2, El Monte 3, Glendale 2, Huntington Park 1, Inglewood 1, Los Angeles 41, Monrovia 1, Pasadena 3, Pomona 2, San Marino 2, Santa Monica 1, Whittier 3, Lynwood 1, South Gate 4, Bell 3, Marin County 1, Merced County 1, Monterey County 1, Carmel 1, Napa 1, Orange County 3, Huntington Beach 1, Newport Beach 1, Santa Ana 12, Corona 2, Sacramento County 1, San Bernardino County 4, Redlands 2, San Diego County 7, La Mesa 1, National City 3, San Diego 82, San Francisco 17, Lodi 9, Manteca 1, San Luis Obispo County 3, San Luis Obispo 1, Menlo Park 1, Lompoc 3, Santa Barbara 2, Santa Maria 2, Santa Clara County 2, Palo Alto 1, San Jose 2, Sonoma County 1, Sutter County 5, Woodland 7, Yuba County 1, Fresno 1.

Pneumonia (Lobar)

54 cases: Alameda County 1, Alameda 2, Hayward 1, Oakland 3, Butte County 1, Los Angeles County 2, Alhambra 1, Burbank 2, Compton 1, Culver City 1, Huntington Park 1, Inglewood 1, Long Beach 1, Los Angeles 21, Pasadena 1, Whittier 1, South Gate 1, Riverside County 1, Sacramento 1, Colton 1, San Diego 2, San Luis Obispo 1, San Jose 1, Tulare County 1.

Scarlet Fever

42 cases: Oakland 3, Sanger 1, Kern County 4, Bakersfield 1, Los Angeles County 10, Glendale 1, Inglewood 1, Los Angeles 5, Monrovia 1, Pasadena 1, South Gate 1, King City 1, Banning 1, Sacramento 1, San Diego 3, San Francisco 2, Shasta County 1, Sutter County 1, Trinity County 1, Dinuba 1.

Smallpox

No cases reported.

Typhoid Fever

7 cases: Kings County 1, Los Angeles 1, Pasadena 1, Madera County 1, Stockton 1, Sonoma County 1, California 1.*

Whooping Cough

351 cases: Alameda County 15, Alameda 15, Berkeley 9, Oakland 20, San Leandro 7, Fresno County 2, Fresno 2, Sanger 1,

Selma 1, Imperial County 1, Bakersfield 2, Los Angeles County 35, Arcadia 1, Azusa 1, Burbank 7, Covina 1, Culver City 1, Huntington Park 4, Long Beach 4, Los Angeles 52, Pasadena 6, Pomona 1, Whittier 2, South Gate 3, Maywood 1, Bell 4, Monterey County 5, Soledad 1, Orange County 3, Anaheim 2, Fullerton 1, Santa Ana 6, Colfax 1, Corona 2, Sacramento 11, San Bernardino 2, San Diego County 9, Chula Vista 2, Escondido 1, National City 4, San Diego 33, San Francisco 14, San Joaquin County 12, Manteca 2, Stockton 1, Paso Robles 1, San Luis Obispo 1, Santa Barbara County 2, Lompoc 10, Santa Maria 2, Santa Clara County 2, Palo Alto 1, San Jose 5, Santa Cruz County 1, Watsonville 1, Sonoma County 2, Santa Rosa 1, Tulare County 3, Davis 9.

Dysentery (Amoebic)

5 cases: Los Angeles County 1, Los Angeles 1, Sacramento 1, San Bernardino County 1, San Francisco 1.

Dysentery (Bacillary)

20 cases: Fresno County 1, Fresno 1, Kings County 1, Los Angeles 12, Palo Alto 2, Sonoma County 3.

Ophthalmia Neonatorum

2 cases: Los Angeles 1, Lompoc 1.

Poliomyelitis

8 cases: Fresno 1, Kern County 1, Los Angeles County 1, San Joaquin County 1, Stockton 2, Shasta County 1, Siskiyou County 1.

Tetanus

2 cases: Kern County 1, Los Angeles County 1.

Trachoma

One case: Los Angeles County.

Encephalitis (Epidemic)

2 cases: Fresno 1, California 1.*

Paratyphoid Fever

One case: Alameda County.

Trichinosis

One case: Sonoma County.

Typhus Fever

One case: Los Angeles.

Jaundice (Epidemic)

7 cases: Los Angeles County.

Food Poisoning

46 cases: Butte County 43, Pacific Grove 3.

Undulant Fever

3 cases: Berkeley 1, Pacific Grove 1, Orange 1.

Coccidioidal Granuloma

One case: Los Angeles.

Relapsing Fever

One case: San Bernardino County.

Epilepsy

33 cases: Alameda 1, Oakland 3, Los Angeles County 1, Glendale 1, Los Angeles 15, Pasadena 3, South Pasadena 1, San Bernardino County 1, San Francisco 2, San Joaquin County 4, San Mateo County 1.

Rabies (Animal)

12 cases: Los Angeles County 1, Hermosa 1, San Diego 10.

* Cases charged to "California" represent patients ill before entering the State or those who contracted their illness traveling about the State throughout the incubation period of the disease. These cases are not chargeable to any one locality.

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